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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#100
3/4/97

In re Application of:

Yong-Geun KIM

Serial No.: 08/250,770

Examiner: D. Yockey

Filed: 27 May 1994

Art Unit: 2108

For: METHOD AND APPARATUS FOR CONTROLLING A LIGHT SIGNAL IN
ELECTROPHOTOGRAPHIC RECORDING APPARATUS

Appeal No.

RECEIVED
FEB 21 1997
GROUP 2100The Honorable Commissioner
of Patents & Trademarks
Washington, D.C. 20231

ATTENTION: Board of Patent Appeals and Interferences

APPELLANT'S BRIEF (37 CFR §1.192)

This brief is in furtherance of the Notice of Appeal filed in this case on 10 December 1996.

The fees required under §1.17(f) for the filing of the Appellant's Brief are dealt with in the accompanying transmittal letter.

This brief is transmitted in triplicate (37 CFR §1.192(a)).

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APPEAL BRIEF

I. STATEMENT OF REAL PARTY IN INTEREST

Pursuant to 37 CFR §1.192(c)(1) the real party in interest is:

SamSung Electronics Co., Ltd.
3425 Maetan-dong, Paldal-ku,
Suwon City, Kyungki-do,
Republic of Korea

II. RELATED APPEALS AND INTERFERENCES

Pursuant to 37 CFR §1.192(c)(2), there are no appeals nor interferences known to the Appellant, the Appellant's legal representative, or the Assignee (real party of interest) which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-24 are pending.

IV. STATUS OF AMENDMENTS AFTER FINAL

The Amendment filed 10 December 1996 has been entered. The Amendment filed 5 February 1997 has not yet been considered.

V. SUMMARY OF THE INVENTION

Referring to Fig. 3, data transmitting unit 10 receives the video data to be printed via

data bus line 2 and converts the data received into serial of video data according to the first clock signal provided via a line 52 and, by responding to the horizontal synchronization signal exhibiting a predetermined time interval that is fed in on line 14, transmits the converted video data through line 12. A printing control unit 20 controls the mechanism required for printing the video data by means of electrical signals and provides the beam data used to switch the light generation of light source element 68 located in the beam scanning unit 30 to the light source element via a line 32 to emit light beam 90. The beam data is obtained from the chopped video data fed in via a line 102. Also the printing control unit 20 receives and processes the beam detection signals generated by the light source element through a line 34, and provides via line 14 the horizontal synchronization signal generated by processing the beam detection signals. Note that the printing control unit 20 is generally called an engine control unit. Also, for the light source element, a semiconductor laser capable of producing 0.6 milli-Watts is used.

A chopping unit 100 is preferably constructed using an logic stage such as an AND gate having one input port coupled to receive serial video data via lead 12 from data transmitting unit 10 and a second input port coupled to receive the second clock signal via lead 62; the output port of the logic stage such as an AND gate would be coupled to printing control unit 20. During operation of the chopping unit 100, the data generated by chopping the converted video data applied through lead 12 in response to the second clock signal fed in via a lead 62, is provided to lead 102 as the chopped video data. Here, the term "chopped" means that the video data is divided according to the second clock signal. This is carried out by gating of the AND gate with the second clock signal.

A clock signal generator 40 generates local, or basic, clock signals and then, applies these clock signals to a lead 42. A first divider 50 divides the basic clock signals with a certain dividing ratio and, then provides the first clock signal to lead 52. A second divider 60 divides the basic clock signal according to dividing ratio data component of the video data received via lead 2, separated from the video data through output port 5 and fed in through a line 3 and then, provides the second clock signal on a line 62, where, the second divider 60 may have a PWM function. An output port 5 is connected between the data bus line 2 and the line 3, and stores the dividing ratio data. Here, line 2 is normally made up of sixteen bits or thirty-two bits, and line 3, eight bits. That is, the data output device 1 such as a computer connected through the line 2, provides designated dividing ratio data as a component of the video data signal transmitted via lead 2, in accordance with the selection by the user and the printing data.

After assuming that the dividing ratio data is designated via the data output device 1, referring to Figs. 4A to 4G with an illustration describing the chopping operation carried out by the chopping unit 100, a waveform of Fig. 4E is output on the output line 102 of the chopping unit 100 if an assumption that waveforms of Figs. 4A, 4B, 4C, and 4D are output respectively on the line 42, the line 52, the line 12, and the line 62 in Fig. 3 is given. Intervals C1, C2, and C3 in the waveform of Fig. 4C are the same as those of T1, T2, and T3 in Fig. 2. Note that the number of high pulses as shown in the intervals E1, E3 in the waveform of Fig. 4E will be larger than the number of pulses in the waveform of Fig. 4C. Also, the waveform of Fig. 4E is changed to the waveform of Fig. 4G in case the waveform of Fig. 4D changes to a waveform of Fig. 4F. That is, if the frequency of the second clock signal provided by second divider 60 to line 62 is

changed by a user applying video data via lead 2 containing a dividing ratio component that is greater by a factor of two than the dividing ratio that was applied to second divider 60 to produce the second clock signal with the pulse frequency shown in Fig. 4D, the frequency of the second clock signal will be correspondingly changed to provide the waveform illustrated in Fig. 4F exhibiting a pulse frequency twice that of the second clock signal waveform illustrated in Fig. 4D; concomitantly, the frequency of the chopped video data transmitted by chopping unit 102 via line 102 also changes by a factor of two, as is illustrated by with waveform of Fig. 4G.

Accordingly, the printing control unit 20 inputs the chopped video data through the line 102 and then, printing control unit 20 outputs the beam data for switching the light source element through line 32. Here, the beam data is almost the same as that on line 102. In response to this data, light source element 68 in beam scanning unit 30 lights up to generate laser beam 90. Laser beam 90 generated by light source element 68 has a wavelength of 650 to 800 nM, generally.

Also, the faster the second clock signal operates the greater the number of chopping operations occur. As a result, the effective amount of light illuminating the photosensitive drum decreases. On the contrary, when the user designates a smaller dividing ratio data by using software (e.g., abstractly represented by mode selector 66) to specify the dividing ratio component of the video data transmitted via data bus 2 in order to lower the frequency of the second clock signal (i.e., to set the second frequency to a lower value), the chopped video data transmitted via line 102 has a lower pulse frequency and consequently, the amount of light emitted by source 68 increases. Accordingly, the amount of light to which each point on the photosensitive surface of

the drum is exposed is increased and thus, the density of the toner is increased. In this manner, printing quality, that is, the sharpness of printed images, is determined by changing the amount of toner attached during the developing process according to the change in the amount of light emitted by light source 68 of beam scanning unit 30, and thus, the amount of light illuminating the exterior circumferential surface of the photosensitive drum. See page 11, line 1 through page 14, line 11.

VI. ISSUES

Whether claim 5 is allowable under 35 U.S.C. §112, second paragraph.

Whether claims 1-24 are patentable under 35 U.S.C. §103 over Figs. 1, and 2A-2D of the present application in view of Tomita *et al.* 4,918,462 and Hayashi *et al.* 4,989,039.

VII. GROUPING OF CLAIMS

Claims 1, 5, 7 and 11 stand or fall alone. Claims 2-4, 6, 9 12-15 and 24 stand or fall with claim 1. Claims 8, 10 and 17-22 stand or fall with claim 7. Claim 16 stands or falls with claim 5.

VIII. ARGUMENT

1. Claim 5 is allowable under 35 USC §112, second paragraph.

The Examiner stated:

"The claims include recitation of means without specification of a function therefore; e.g. claim 5 recites mode selecting means, but specifies no function therefor."

Claim 5, however states in part: *mode selecting means enabling a user to change a characteristic of said second clock signal*. Accordingly, the "means" of claim 5 is the *mode selection means*, and the claimed function for the mode selection means is *enabling a user to change a characteristic of said second clock signal*.

The Examiner has stated in the Advisory Action (Paper No. 17), mailed 7 January 1997, that claim 5:

"does not recite 'means for enabling...' as would conform to 35 USC 112, sixth paragraph". . . . and "provides proof that the claimed recitation does not conform to the format of a 'means' recitation set forth in 35 USC 112, sixth paragraph." (see page 2, last three lines through page 3, line 6).

The Examiner has failed to show how claim 5 is "indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention." Accordingly, the Examiner has not provided any reasons for rejecting claim 5 under 35 U.S.C. §112, second paragraph. Therefore, the rejection is deemed to be in error and should not be sustained.

Further, 35 U.S.C. §112, sixth paragraph states:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the

specification and equivalents thereof.

There is no requirement in §112, sixth paragraph which states that a means-plus-function claim be written as "means for ...", as indicated by the Examiner. Although the use of a prepositional phrase as a modifier of the term "means" may be suggested in §112, paragraph six, the "statute is not construed to require a particular grammatic construction so long as modifier 'means' specifies a function to be performed", see *Ex parte Klumb*, 159 USPQ 694. Therefore the rejection is deemed to be in error and should not be sustained.

2. Claims 1-24 are patentable under 35 U.S.C. §103 over Figs. 1, and 2A-2D of the present application in view of Tomita *et al.* 4,918,462 and Hayashi *et al.* 4,989,039.

Claims 1-24 were rejected under 35 U.S.C. §103, as rendered obvious and unpatentable, over Prior Art Figs. 1 and 2A-2D, in view of Tomita *et al.* (*hereafter*: Tomita) and Hayashi *et al.* (*hereafter*: Hayashi). The rejection is deemed to be in error for the following reasons.

First, note that Figs. 2A-2D are the result of the Appellant's own work using the "Prior Art" device of Fig. 1. Accordingly, Figs. 2A-2D are not prior art because, as evidenced from the Declaration/Oath, the Appellant is a citizen of Korea, and, as such, performed the work on the device of Fig. 1 in Korea in order to obtain the results depicted in Figs. 2A-2B. Therefore, since there is no showing that Figs. 2A-2D were known to anyone other than the Appellant *in this country* nor is there a showing that Figs. 2A-2D were *patented or published in this country or a foreign country*, then Figs. 2A-2D can not be deemed to be "Prior Art".

Second, "Prior Art" Fig. 1 illustrates an electrophotographic developing device having a beam scanning unit 30 which is switched over according to beam data to generate a laser beam to be scanned upon a photosensitive drum.

It is important to note that the problem confronted by the Appellant must be considered in determining whether it would have been obvious to combine references in order to solve that problem. See *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 7 USPQ2d 1315 (CAFC 1988).

Accordingly, the question raised is, if one of ordinary skill in the art were looking for an alternate method for adjusting the density of printed images without adjusting the bias voltage of a developing unit in a laser printing device, such as that depicted by Prior Art Fig. 1, would one of ordinary skill in the art have looked to the Tomita and Hayashi patents?

Tomita teaches one of ordinary skill in the art that in order to compensate for the different characteristics of each element of the LED array it has been proposed to change the driving time for each element. However, this will result in uneven dot image shapes and a lack of uniformity (col. 1, lines 20-34). Tomita further teaches that the proposed fix results in a possibility of unevenness in density among the elements. Tomita contemplates a method and apparatus for driving a solid scan type recording head (col. 2, lines 32-40) capable of reducing the difference in density of the dots shapes generated by each element.

Tomita is for a solid scan device, *i.e.*, a device using an LED array whereas the device in Prior Art Fig. 1 uses a laser beam. The problem of different densities between elements in an LED array do not occur in a laser driven device, which does not have a plurality of elements. Accordingly, one of ordinary skill in the art would not have been motivated by Tomita to modify the laser printing device of Prior Art Fig. 1.

Appellant teaches that in order to control the printing density in a laser device, such as Prior Art Fig. 1, it is known that the bias voltage of a developer is changed to adjust the amount of the toner developed. Accordingly, an object of the present invention is to adjust the density of printed images without adjusting the bias voltage of a developing unit. Tomita is silent with regard to changing the bias voltage of a developer to adjust the amount of the toner developed. Hayashi et al. is also silent in this regard. The Examiner argues that this teaching is not germane to the issue because there is no claim language directed towards changing the bias voltage of the developer unit to adjust the amount of toner developed. We agree that there is no such claim language. That is because the invention is an improvement over Prior Art Fig. 1. It is Prior Art Fig. 1 that comprises the teaching of changing the bias voltage of a developer to adjust the amount of the toner developed, which is germane to the issue of identification of a problem in the Prior Art and a possible solution as determined by the Appellant.

According to the configuration and method of the present invention, chopped video data is generated by the printing control unit as beam data, and is then used for controlling the amount of light illuminating the photosensitive drum. The amount of the light is optimally controlled by

selecting a second clock signal. Therefore, the user can adjust the density of printed images without adjusting the bias voltage of a developing unit.

Hayashi et al. does not provide any teaching which would have suggested using Tomita in order to modify the laser printing device of Prior Art Fig. 1. Hayashi et al. does suggest that a problem regarding image density may have been caused by humidity in a laser printing device. Hayashi et al., however, corrects for this problem by adjusting the current supplied to the laser element (Hayashi et al., col. 7, lines 1-5). Hayashi et al. does not suggest that this varying of the current to the laser device is in any way an alternative to the known method of changing the bias voltage of a developer to adjust the amount of the toner developed. Hayashi et al. may teach modifying the current supplied to beam scanning unit 30 of Prior Art Fig. 1, but Hayashi et al. clearly does not teach nor suggest adjusting density in Prior Art Fig. 1 by chopping the data provided by data transmitting unit 10 in accordance with a second clock signal in order to provide chopped data to the print control unit 20.

The Examiner has indicated that the reasons for combining the references is to "enable change of power level of the admitted prior art [Prior Art Fig. 1] light source in accordance with changes in environmental conditions, thereby facilitating provision of an image forming apparatus capable of forming an image with satisfactory tonal rendition regardless of changes in environmental conditions". As such, the Examiner insists that the proposed combination "involves solution of a problem which differs significantly from that disclosed by Appellant and is suggested by the cited references". We shall discuss this "problem" as follows:

Deficiencies in the factual basis cannot be supplied by resorting to speculation or unsupported generalities. *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967) and *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970). There is no teaching regarding Prior Art Fig. 1 that there is a problem with forming an image with satisfactory tonal rendition due to changes in environmental conditions. Prior Art Fig. 1 already teaches controlling the image density. This control is performed by changing the bias voltage of a developer to adjust the amount of the toner developed. Accordingly, there is no factual evidence that there is a problem with Prior Art Fig. 1 with regard to forming an image with satisfactory tonal rendition due to changes in environmental conditions.

Additionally, although Hayashi teaches such a problem may exist, in some prior art laser printing devices, Hayashi does not teach that the problem exists with a prior art laser printing device wherein it is known that the bias voltage of a developer is changed to adjust the amount of the toner developed, such as Prior Art Fig. 1. Which is why the teaching of Prior Art Fig. 1 with regard to changing the bias voltage of a developer to adjust the amount of the toner developed, is germane to the issue. Since Prior Art Fig. 1 already adjusts toner development, which could have been due to environmental conditions, then there is no teaching that applying Hayashi is necessary. The Examiner appears to suggest (Paper No. 17, page 4, lines 1-6) that since the bias voltage is changed *manually* then one of ordinary skill in the art would have applied Hayashi to correct for the problem due to environmental conditions. It is Appellant's position that one of ordinary skill in the art would have learned from Hayashi that environmental conditions effect toner development and that such environmental conditions could be detected as taught

in Hayashi and then the bias voltage in Prior Art Fig. 1 could have been adjusted automatically instead of manually since Hayashi does not teach nor suggest that varying the current to the laser device is in any way an alternative to, or better than, the known method of changing the bias voltage of a developer to adjust the amount of the toner developed. Therefore, there is no *prima facie* basis for modifying Prior Art Fig. 1 nor for combining the applied art of Tomita, Hayashi and Prior Art Fig. 1 to derive an invention similar to Appellant's. Therefore, the rejection is deemed to be in error and should be withdrawn.

Further, Tomita is silent with regard to the "problem with forming an image with satisfactory tonal rendition due to changes in environmental conditions." Instead, Tomita desires to compensate for the different characteristics of each element of the LED array. Accordingly, one of ordinary skill in the art would not have had any reason to look to Tomita for a solution to the apparent problem of forming an image with satisfactory tonal rendition due to changes in environmental conditions. Accordingly, the Examiner has not provided a *prima facie* basis for combining all the applied reference, and in particular, has not provided a *prima facie* basis for including Tomita in the proposed combination of Hayashi and Prior Art Fig. 1. Therefore, the rejection is deemed to be in error and should be withdrawn. Prior Art Fig. 1 already teaches controlling the image density.

The Examiner has erroneously indicated that because Tomita teaches changing the power level of a light source and that Hayashi teaches it is known to change the power level of a light source due to environmental conditions then it would have been obvious to derive an image

forming apparatus capable of forming an image with satisfactory tonal rendition regardless of changes in environmental conditions by combining the teachings of Prior Art Fig. 1, Tomita and Hayashi.

A review of Paper No. 17, page 3, line 9-page 4, line 15, clearly indicate that the Examiner is considering only certain portions of the applied art, using the Appellant's claims as a blue print, instead of considering the applied art on the whole. If one of ordinary skill in the art had found Prior Art Fig. 1 device's ability to form an image with satisfactory tonal rendition due to changes in environmental conditions to be deficient, then the bias voltage of a developer would have been changed to adjust the amount of the toner developed. It is noted that Hayashi teaches 1) an image forming device using laser and 2) regulating the amount of light of the laser due to environmental conditions. Hayashi, however, does not suggest that this varying of the current to the laser device is in any way an alternative to the known method of changing the bias voltage of a developer to adjust the amount of the toner developed. However, since there is no teaching of such a problem with regard to Prior Art Fig. 1, then there is clearly no *prima facie* basis for looking to Hayashi. Further, as noted above, if one of ordinary skill in the art had found Prior Art Fig. 1's ability to form an image with satisfactory tonal rendition due to changes in environmental conditions to be deficient and then looked to Hayashi to solve the problem, there is still no *prima facie* basis supporting the Examiner's suggestion of looking to Tomita for a solution of the problem, since the *supposed* problem would already have been solved by the combination of Prior Art Fig. 1 and Hayashi. The Examiner has not indicated why one of ordinary skill in the art would have found it necessary to apply the teaching of Tomita other than

a hindsight basis of needing a teaching of a *chopping means* in order to reject the pending claims.

Accordingly, the rejection is deemed to be in error and should not be sustained.

Additionally, the proposed combination fails to teach or suggest *chopping means for providing chopped data by dividing the converted data from said data transmitting means in accordance with a second clock signal* as set forth in claim 1. The proposed combination as set forth by the Examiner may include an AND gate as taught by Tomita, but there is no teaching that the data is chopped by dividing the data. The proposed combination only teaches turning an AND gate on/off to limit the length of time the data is output. Tomita does not provide a timing diagram or a diagram illustrating the effect that the AND gate has on the data. The Appellant, however shows in Fig. 4E the effect of chopping and dividing of the data Fig. 4C by the second clock signal Fig. 4D.

Regarding claim 5, the proposed combination of art fails to teach or suggest *mode selecting means enabling a user to change a characteristic of said second clock signal*. The Examiner has referred to element 7 of Tomita as the mode selecting means (Paper No. 10, page 5, lines 1-6), however, Tomita's "mode selecting means" is responsive to selection signals provided by a central processing unit and has not been described as being user selectable (col. 6, lines 6-11). Accordingly, the rejection is deemed to be in error and should not be sustained.

Regarding claim 7, the proposed combination of art fails to teach or suggest *second means*


for generating said second clock signal by dividing said local clock signal in response to a dividing ratio component accompanying said input data. Tomita's second clock signal is not based on a dividing ratio component accompanying the input data and neither Prior Art Fig. 1 nor Hayashi teach or suggests dividing ratio component accompanying the input data. Accordingly, the rejection is deemed to be in error and should not be sustained.

Claim 11 calls for a component of said input data specifying a dividing ratio; means for setting a frequency exhibited by said second clock signal in dependence upon said component; and said chopping means dividing said converted data into a series of pulses exhibiting a pulse frequency corresponding to said frequency exhibited by said second clock signal. None of the applied references teach or suggest converting data into a series of pulses exhibiting a pulse frequency corresponding to the frequency of the second clock signal. Accordingly, the rejection is deemed to be in error and should not be sustained.

CONCLUSION

In view of the forgoing demonstration of deficiencies in the outstanding rejection demonstrated with respect to the finally rejected claims, the Board is requested to refuse to sustain the rejection.

Respectfully submitted,


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IX. APPENDIX

Claims 1-24 are presented as finally rejected.

CLAIMS UNDER APPEAL

1 1. (Twice Amended) An electrophotographic developing type reproduction apparatus,
2 comprising:

3 data transmitting means for generating converted data by converting input data, to
4 be printed as video data, in accordance with a first clock signal, and for transmitting the converted
5 data in response to a horizontal synchronization signal exhibiting a predetermined time interval;

6 chopping means for providing chopped data by dividing the converted data from
7 said data transmitting means in accordance with a second clock signal; and

8 printing control means for providing beam data in response to said chopped data,
9 for controlling printing of the video data by generating electrical signals to control generation of
10 a laser beam by a light source element;

11 said print control means generating said horizontal synchronization signal in
12 correspondence with a beam detection signal derived from the laser beam by the light source
13 element.

1 2. The electrophotographic developing type reproduction apparatus of claim 1, further
2 comprised of the second clock signal having a frequency greater than the first clock signal.

1 3. The electrophotographic developing type reproduction apparatus of claim 1, further
2 comprised of a frequency of the second clock signal being an integer multiple of a frequency of
the first clock signal.

1 4. (Amended) The electrophotographic developing type reproduction apparatus of in claim
2 1, further comprised of said chopping means comprising an AND gate having a first input port
3 coupled to receive said converted data and a second input port coupled to receive said second

4 clock signal.

1 5. (Amended) The electrophotographic developing type reproduction apparatus of claim
2 1, further comprised of mode selecting means enabling a user to change a characteristic of said
3 second clock signal.

1 6. The electrophotographic developing type reproduction apparatus of claim 1, further
2 comprised of a semiconductor laser device serving as the source element.

1 7. (Amended) The electrophotographic developing type reproduction apparatus of claim
2 1, comprised of:

3 first means for generating a local clock signal; and

4 second means for generating said second clock signal by dividing said local clock
5 signal in response to a dividing ratio component accompanying said input data.

1 8. The electrophotographic developing type reproduction apparatus of claim 1,
2 comprised of:

3 means for generating a local clock signal;

4 first means for generating said first clock signal by dividing said local clock signal;

5 and

6 second means for generating said second clock signal by dividing said local clock
7 signal in dependence upon a dividing ratio component of said input data.

1 9. The electrophotographic developing type reproduction apparatus of claim 1,
2 comprised of said chopping means intermittently transmitting said serial video data during pulses
3 of said second clock signal.

1 10. The electrophotographic developing type reproduction apparatus of claim 1,
2 comprised of:

3 a component of said input data specifying a dividing ratio; and
4 means for setting a frequency exhibited by said second clock signal in dependence
5 upon said component.

1 11. The electrophotographic developing type reproduction apparatus of claim 1,
2 comprising:

3 a component of said input data specifying a dividing ratio;
4 means for setting a frequency exhibited by said second clock signal in dependence
5 upon said component; and
6 said chopping means dividing said converted data into a series of pulses exhibiting
7 a pulse frequency corresponding to said frequency exhibited by said second clock signal.

1 12. (Twice Amended) A method for controlling a laser signal in an electrophotographic
2 developing type reproduction apparatus, said method comprising the steps of:

3 generating converted data by converting input data to be printed into video data,
4 in accordance with a first clock signal, and for transmitting the converted video data in response
5 to a horizontal synchronization signal exhibiting a predetermined time interval;

6 generating chopped data by dividing the converted data in dependence upon a
7 second clock signal;

8 supplying beam data for controlling generation of said laser signal by a light source
9 element in response to said chopped data; and

10 generating said horizontal synchronization signal in dependence upon a beam
11 detection signal obtained by detecting said laser signal.

1 13. The method of claim 12, comprising the second clock signal having a frequency
2 higher than the first clock signal.

1 14. The method of claim 12, comprising a frequency of the second clock signal being
2 an integer multiple of a frequency of the first clock signal.

1 15. The method of claim 12, comprised of generating the chopped data by applying the
2 converted data to a first input port of an AND gate data and applying the second clock signal to
3 a second input port of the AND gate.

1 16. The method of claim 15, comprised of changing a characteristic of the second clock
2 signal in response to a selection made by a user of the reproduction apparatus.

1 17. (Amended) An apparatus for printing video data, comprising:
2 data bus means having a first data line for providing input video data and a second
3 data line for providing dividing ratio data;
4 clock signal generating means for generating a first clock signal and for generating
5 a second clock signal, said second clock signal exhibiting a characteristic depending upon said
6 dividing ratio data;
7 data transmitting means for converting said input video data into serial video data
8 in response to said first clock signal, and for transmitting said serial video data in response to a
9 horizontal synchronization signal;
10 logic means for providing chopped video data in dependence upon said serial video
11 data and said second clock signal;
12 printing control means for generating beam data in response to said chopped video
13 data; and
14 beam scanning means for providing a laser beam for defining images corresponding
15 to said beam data;
16 said beam scanning means generating a beam detection signal derived from
17 scanning of said laser beam;
18 said printing control means generating said horizontal synchronizing signal in
19 dependence upon said beam detection signal.

1 18. (Amended) The apparatus of claim 17, comprised of generating said first clock signal

2 with a frequency less than said second clock signal.

1 19. (Amended) The apparatus of claim 17, comprised of generating said first clock signal
2 with a frequency equal to said second clock signal.

1 20. (Amended) The apparatus of claim 17, comprised of said clock signal generating
2 means comprising means for changing said characteristic of said second clock signal in
3 correspondence with changes in said dividing ratio data.

1 21. (Amended) The apparatus of claim 17, comprised of said clock signal generating
2 means comprising:
3 first means for generating a local clock signal; and
4 second means for generating said second clock signal by dividing a frequency of
5 said local clock signal in dependence upon said dividing ratio data.

1 22. (Twice Amended) The apparatus of claim 17, comprised of said clock signal
2 generating means comprising:
3 means for generating a local clock signal exhibiting a first plurality of pulses
4 characterized by a local frequency;
5 first means for generating said first clock signal by dividing pulses of said local
6 clock signal to provide a second plurality of pulses characterized by a second frequency; and
7 second means for generating said second clock signal by dividing said pulses of said
8 local clock signal in dependence upon said dividing ratio data, to provide a third plurality of
9 pulses characterized by a third frequency established in dependence upon said dividing ratio data.

1 23. (Amended) An apparatus for printing video data, comprising:
2 data bus means having a first data line for providing input video data and a second
3 data line for providing dividing ratio data;
4 clock signal generating means for generating a first clock signal and for generating

5 a second clock signal, said second clock signal exhibiting a characteristic depending upon said
6 dividing ratio data, said clock signal generating means comprising:

7 means for generating a local clock signal exhibiting a first plurality of
8 pulses characterized by a local frequency;

9 first means for generating said first clock signal by dividing pulses of said
10 local clock signal to provide a second plurality of pulses
11 characterized by a second frequency; and

12 second means for generating said second clock signal by dividing said
13 pulses of said local clock signal in dependence upon said dividing
14 ratio data, to provide a third plurality of pulses characterized by a
15 third frequency established in dependence upon said dividing ratio
16 data;

17 data transmitting means for converting said input video data into serial video data
18 in response to said first clock signal, and for transmitting said serial video data in response to a
19 horizontal synchronization signal;

20 logic means for providing chopped video data in dependence upon said serial video
21 data and said second clock signal;

22 printing control means for generating beam data in response to said chopped video
23 data; and

24 beam scanning means for providing a laser beam for defining images corresponding
25 to said beam data and for generating a beam detection signal derived from scanning of said laser
26 beam;

27 said printing control means generating said horizontal synchronizing signal in
28 dependence upon said beam detection signal.

1 24. (Amended) A method for controlling a laser signal in an electrophotographic
2 developing type reproduction apparatus, said method comprising the steps of:

3 generating converted data by converting input data to be printed into video data,
4 in accordance with a first clock signal, and for transmitting the converted video data in response

5 to a horizontal synchronization signal exhibiting a predetermined time interval;

6 generating chopped data by dividing the converted data in dependence upon a
7 second clock signal, the second clock signal having a frequency higher than the first clock signal
8 wherein the second clock signal being an integer multiple of a frequency of the first clock signal,
9 the chopped data being generated by applying the converted data to a first input port of an AND
10 gate data and applying the second clock signal to a second input port of the AND gate, said
11 chopped data being output from an output port of said AND gate;

12 changing a characteristic of the second clock signal in response to a selection made
13 by a user of the reproduction apparatus;

14 supplying beam data for controlling generation of said laser signal by a light source
15 element in response to said chopped data; and

16 generating said horizontal synchronization signal in dependence upon a beam
17 detection signal obtained from said laser signal.

X. APPENDIX

Claims 1-4 and 6-24 are presented as finally rejected. Claim 5 is presented as amended on 5 February 1997, such amendment having not yet been considered.

CLAIMS UNDER APPEAL

1 1. (Twice Amended) An electrophotographic developing type reproduction apparatus,
2 comprising:

3 data transmitting means for generating converted data by converting input data, to
4 be printed as video data, in accordance with a first clock signal, and for transmitting the converted
5 data in response to a horizontal synchronization signal exhibiting a predetermined time interval;

6 chopping means for providing chopped data by dividing the converted data from
7 said data transmitting means in accordance with a second clock signal; and

8 printing control means for providing beam data in response to said chopped data,
9 for controlling printing of the video data by generating electrical signals to control generation of
10 a laser beam by a light source element;

11 said print control means generating said horizontal synchronization signal in
12 correspondence with a beam detection signal derived from the laser beam by the light source
13 element.

1 2. The electrophotographic developing type reproduction apparatus of claim 1, further
2 comprised of the second clock signal having a frequency greater than the first clock signal.

1 3. The electrophotographic developing type reproduction apparatus of claim 1, further
2 comprised of a frequency of the second clock signal being an integer multiple of a frequency of
the first clock signal.

1 4. (Amended) The electrophotographic developing type reproduction apparatus of in claim
2 1, further comprised of said chopping means comprising an AND gate having a first input port

coupled to receive said converted data and a second input port coupled to receive said second clock signal.

5. (Twice Amended) The electrophotographic developing type reproduction apparatus of claim 1, further comprised of mode selecting means for enabling a user to change a characteristic of said second clock signal.

6. The electrophotographic developing type reproduction apparatus of claim 1, further comprised of a semiconductor laser device serving as the source element.

7. (Amended) The electrophotographic developing type reproduction apparatus of claim 1, comprised of:

first means for generating a local clock signal; and

second means for generating said second clock signal by dividing said local clock signal in response to a dividing ratio component accompanying said input data.

8. The electrophotographic developing type reproduction apparatus of claim 1, comprised of:

means for generating a local clock signal;

first means for generating said first clock signal by dividing said local clock signal;

and

second means for generating said second clock signal by dividing said local clock signal in dependence upon a dividing ratio component of said input data.

9. The electrophotographic developing type reproduction apparatus of claim 1, comprised of said chopping means intermittently transmitting said serial video data during pulses of said second clock signal.

10. The electrophotographic developing type reproduction apparatus of claim 1,

2 comprised of:

3 a component of said input data specifying a dividing ratio; and

4 means for setting a frequency exhibited by said second clock signal in dependence
5 upon said component.

1 11. The electrophotographic developing type reproduction apparatus of claim 1,
2 comprising:

3 a component of said input data specifying a dividing ratio;

4 means for setting a frequency exhibited by said second clock signal in dependence
5 upon said component; and

6 said chopping means dividing said converted data into a series of pulses exhibiting
7 a pulse frequency corresponding to said frequency exhibited by said second clock signal.

1 12. (Twice Amended) A method for controlling a laser signal in an electrophotographic
2 developing type reproduction apparatus, said method comprising the steps of:

3 generating converted data by converting input data to be printed into video data,
4 in accordance with a first clock signal, and for transmitting the converted video data in response
5 to a horizontal synchronization signal exhibiting a predetermined time interval;

6 generating chopped data by dividing the converted data in dependence upon a
7 second clock signal;

8 supplying beam data for controlling generation of said laser signal by a light source
9 element in response to said chopped data; and

10 generating said horizontal synchronization signal in dependence upon a beam
11 detection signal obtained by detecting said laser signal.

1 13. The method of claim 12, comprising the second clock signal having a frequency
2 higher than the first clock signal.

1 14. The method of claim 12, comprising a frequency of the second clock signal being

an integer multiple of a frequency of the first clock signal.

15. The method of claim 12, comprised of generating the chopped data by applying the converted data to a first input port of an AND gate data and applying the second clock signal to a second input port of the AND gate.

16. The method of claim 15, comprised of changing a characteristic of the second clock signal in response to a selection made by a user of the reproduction apparatus.

17. (Amended) An apparatus for printing video data, comprising:

- data bus means having a first data line for providing input video data and a second data line for providing dividing ratio data;
- clock signal generating means for generating a first clock signal and for generating a second clock signal, said second clock signal exhibiting a characteristic depending upon said dividing ratio data;
- data transmitting means for converting said input video data into serial video data in response to said first clock signal, and for transmitting said serial video data in response to a horizontal synchronization signal;
- logic means for providing chopped video data in dependence upon said serial video data and said second clock signal;
- printing control means for generating beam data in response to said chopped video data; and
- beam scanning means for providing a laser beam for defining images corresponding to said beam data;
- said beam scanning means generating a beam detection signal derived from scanning of said laser beam;
- said printing control means generating said horizontal synchronizing signal in dependence upon said beam detection signal.

1 18. (Amended) The apparatus of claim 17, comprised of generating said first clock signal
2 with a frequency less than said second clock signal.

1 19. (Amended) The apparatus of claim 17, comprised of generating said first clock signal
2 with a frequency equal to said second clock signal.

1 20. (Amended) The apparatus of claim 17, comprised of said clock signal generating
2 means comprising means for changing said characteristic of said second clock signal in
3 correspondence with changes in said dividing ratio data.

1 21. (Amended) The apparatus of claim 17, comprised of said clock signal generating
2 means comprising:

3 first means for generating a local clock signal; and

4 second means for generating said second clock signal by dividing a frequency of
5 said local clock signal in dependence upon said dividing ratio data.

1 22. (Twice Amended) The apparatus of claim 17, comprised of said clock signal
2 generating means comprising:

3 means for generating a local clock signal exhibiting a first plurality of pulses
4 characterized by a local frequency;

5 first means for generating said first clock signal by dividing pulses of said local
6 clock signal to provide a second plurality of pulses characterized by a second frequency; and

7 second means for generating said second clock signal by dividing said pulses of said
8 local clock signal in dependence upon said dividing ratio data, to provide a third plurality of
9 pulses characterized by a third frequency established in dependence upon said dividing ratio data.

1 23. (Amended) An apparatus for printing video data, comprising:

2 data bus means having a first data line for providing input video data and a second
3 data line for providing dividing ratio data;

4 clock signal generating means for generating a first clock signal and for generating
5 a second clock signal, said second clock signal exhibiting a characteristic depending upon said
6 dividing ratio data, said clock signal generating means comprising:

7 means for generating a local clock signal exhibiting a first plurality of
8 pulses characterized by a local frequency;

9 first means for generating said first clock signal by dividing pulses of said
10 local clock signal to provide a second plurality of pulses
11 characterized by a second frequency; and

12 second means for generating said second clock signal by dividing said
13 pulses of said local clock signal in dependence upon said dividing
14 ratio data, to provide a third plurality of pulses characterized by a
15 third frequency established in dependence upon said dividing ratio
16 data;

17 data transmitting means for converting said input video data into serial video data
18 in response to said first clock signal, and for transmitting said serial video data in response to a
19 horizontal synchronization signal;

20 logic means for providing chopped video data in dependence upon said serial video
21 data and said second clock signal;

22 printing control means for generating beam data in response to said chopped video
23 data; and

24 beam scanning means for providing a laser beam for defining images corresponding
25 to said beam data and for generating a beam detection signal derived from scanning of said laser
26 beam;

27 said printing control means generating said horizontal synchronizing signal in
28 dependence upon said beam detection signal.

1 24. (Amended) A method for controlling a laser signal in an electrophotographic
2 developing type reproduction apparatus, said method comprising the steps of:

3 generating converted data by converting input data to be printed into video data,

4 in accordance with a first clock signal, and for transmitting the converted video data in response
5 to a horizontal synchronization signal exhibiting a predetermined time interval;

6 generating chopped data by dividing the converted data in dependence upon a
7 second clock signal, the second clock signal having a frequency higher than the first clock signal,
8 wherein the second clock signal being an integer multiple of a frequency of the first clock signal,
9 the chopped data being generated by applying the converted data to a first input port of an AND
10 gate data and applying the second clock signal to a second input port of the AND gate, said
11 chopped data being output from an output port of said AND gate;

12 changing a characteristic of the second clock signal in response to a selection made
13 by a user of the reproduction apparatus;

14 supplying beam data for controlling generation of said laser signal by a light source
15 element in response to said chopped data; and

16 generating said horizontal synchronization signal in dependence upon a beam
17 detection signal obtained from said laser signal.